CLAIMS

What is claimed is:

1. A variable geometry turbine comprising:

a turbine housing having an inlet for exhaust gas and an outlet, a volute connected to the inlet and an outer nozzle wall adjacent the volute;

a center housing attached to the turbine housing and having a center bore carrying a bearing assembly;

a turbine wheel carried within the turbine housing and attached to a shaft extending through the center housing, the shaft supported by the bearing assembly;

a plurality of vanes having rotation posts extending from a first vane surface substantially parallel to the outer nozzle wall, the posts received in circumferentially spaced apertures in the outer nozzle wall, the vanes further having actuation tabs extending from a second surface of the vanes distal the first vane surface;

a unison ring intermediate the center housing and the vanes, the unison ring having a plurality of slots, the slots receiving the tabs, the unison ring further having an actuation receiver;

a crank shaft movable continuously from a first position to a second position, movement of the crank shaft imparting force to the actuation receiver to urge rotational motion of the unison ring, the rotational motion of the unison ring causing the tabs to move in the slots;

an oil control valve for moving the crank shaft from the first position to the second position wherein the oil control valve includes an electric actuator and a valve stem, the valve stem mechanically isolated from movement of the crank shaft; and

an electronic sensor for sensing movement of the crank shaft.

2. The variable geometry turbine of claim 1, wherein the electric actuator actuates the valve stem in response to a pulse width modulated signal.

3. The variable geometry turbine of claim 2, wherein the pulse width modulate signal has a frequency in a range from approximately 80 Hz to approximately 150 Hz.

4. The variable geometry turbine of claim 2, wherein the pulse width modulated signal reduces static friction of the valve stem.

5. The variable geometry turbine of claim 1, wherein the electric actuator actuates the valve stem based on a signal having a duty cycle and wherein a constant, non-zero duty cycle maintains the valve stem in a substantially steady position.

6. The variable geometry turbine of claim 1, wherein the electronic sensor includes a resonator circuit.

7. The variable geometry turbine of claim 6, wherein moving the crank shaft moves the resonator circuit.

8. A control system for a variable geometry turbine comprising:

a control valve that includes an electric actuator operatively coupled to a valve stem;

a piston operatively coupled to one or more hydraulic fluid paths controlled by the control valve and including a piston shaft;

a rotatable shaft operatively coupled to the piston shaft and mechanically isolated from the valve stem and capable of adjusting geometry of the variable geometry turbine; and

an electronic sensor capable of sensing an angular position of the rotatable shaft.

9. The control system of claim 8, wherein the electric actuator actuates the valve stem based at least in part on a pulse width modulated signal.

10. The control system of claim 9, wherein the pulse width modulate signal has a frequency in a range from approximately 80 Hz to approximately 150 Hz.

11. The control system of claim 9, wherein the pulse width modulated signal reduces static friction of the valve stem.

12. The control system of claim 8, wherein the electronic sensor includes a resonator circuit.

13. The control system of claim 12, wherein a rotation of the rotatable shaft causes rotation of the resonator circuit.

14. The control system of claim 8, wherein a closed control loop exists between a control signal provided to the control valve and an output signal of the electronic sensor.

15. The control system of claim 14, wherein the closed control loop relies on one or more parameters related to operating conditions of an internal combustion engine.

16. The control system of claim 8, wherein the control valve is suitable for use in controlling cam timing of an internal combustion engine.

17. A method for controlling a variable geometry turbine comprising:

providing a pulse width modulated signal to a control valve having a valve stem;

in response to the providing, moving the valve stem;

in response to the moving, flowing hydraulic fluid;

in response to the flowing, translating a piston;

in response to the translating, rotating a crank shaft wherein the crank shaft is mechanically isolated from the valve stem;

in response to the rotating, adjusting one or more geometry elements of the variable geometry turbine; and

determining geometry based at least in part on angular position of the crank shaft.

18. The method of claim 17, wherein the moving depends on a duty cycle of the pulse width modulated signal.

19. The method of claim 17, wherein the providing provides a signal having a frequency in a range from approximately 80 Hz to approximately 150 Hz.

20. The method of claim 17, wherein the determining includes receiving one or more signals from a resonator circuit that rotates in response to the rotating.

21. The method of claim 20, wherein at least one of the one or more signals varies as a sinusoid.

22. A turbocharger housing comprising one or more spiral windings capable of supplying phase information to a phase detector and positioned proximate to an opening capable of receiving a member selected from the group consisting of a rotatable member, a translatable member and a translatable and rotatable member.

23. The turbocharger housing of claim 22 further comprising the member positioned at least partially in the opening wherein the member comprises a resonator circuit positioned thereon or therein.

24. A turbocharger housing comprising one or more resonator circuits capable of interacting with one or more spiral windings and positioned proximate to an opening capable of receiving a member selected from the group consisting of a rotatable member, a translatable member and a translatable and rotatable member.

25. The turbocharger housing of claim 24 further comprising the member positioned at least partially in the opening wherein the member comprises the one or more spiral windings positioned thereon or therein.

26. A variable geometry turbine comprising:

a crank shaft movable continuously from a first position to a second position, movement of the crank shaft imparting force to an actuation receiver to alter flow geometry to a turbine;

an oil control valve for moving the crank shaft from the first position to the second position wherein the oil control valve includes an electric actuator and a valve stem, the valve stem mechanically isolated from movement of the crank shaft; and

an electronic sensor for sensing movement of the crank shaft.